Platforms

Bridging the gap between construction + manufacturing

22 March 2018

Jaimie Johnston, Bryden Wood
Director + Head of Global Systems
Delivery Platforms for Government Assets
Creating a marketplace for manufactured spaces

Data Driven Infrastructure
From digital tools to manufactured components

Platforms
Bridging the gap between construction + manufacturing

www.brydenwood.co.uk/filedownload.php?a=18-59db7e15aa5f8
www.brydenwood.co.uk/filedownload.php?a=17-59db7e158287a
www.brydenwood.co.uk/filedownload.php?a=360-5aaf9367d5105
What are platforms?

- **Component**: Engine block, Shipping container
- **Platform**: Chassis, Global freight infrastructure
- **Product**: Car, Uber, iPhone

Low cost, reliable global trade + supply chains
Peer-to-peer ride sharing, food delivery and transportation network
Construction platforms

Platforms consist of...

Components

Products

Defined connections + interfaces

Components, products + sub-assemblies may be used in multiple Platforms

Standardised manufacturing processes

Sub-assemblies

Sub Assembly Workstations

High performing assets, networks + systems

Products

Defined connections + interfaces

Components

Sub-assemblies

Standardised manufacturing processes

Sub Assembly Workstations

High performing assets, networks + systems
MOJ platforms by building

Structural platform (inner ring) + facade system (outer ring) by building

Superstructure system types
- House block
- Platform 2
- Platform 3
- Platform 4
- Not currently systemised, but could be modularised

Facade system types
- Super block
- Lightweight facade
- Not currently systemised

Building costs by primary system
- House block: 20.6%
- Entrance resource hub: 10.2%
- Heavy workshop: 2.9%
- Other: 66.3%
The test for platform efficiency:

- The least amount of raw material;
- Handled and / or moved:
  - The fewest number of times;
  - Through the least amount of processes;
  - By upskilled and / or highly productive people
  - By the fewest number of people overall;
- Delivered to site at the right time, in the right sequence, with the correct information.
Platform 2

- No fabrication / very low level of fabrication
- Low level of fabrication (bolted connections)
- High level of fabrication (welding and bespoke production)

- Weight of beams:
  - ≤25kg
  - 26 - 52kg
  - 74kg

- 8 types of column brackets;
- 10 types of baseplate brackets;
- 12 types of bracing brackets.
**Benchmarking summary**

<table>
<thead>
<tr>
<th></th>
<th>Flat slab concrete frame £/m² GIFA</th>
<th>Composite slab steel frame £/m² GIFA</th>
<th>Platform 2 £/m² GIFA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>£ 41.57</td>
<td>£ 16.93</td>
<td>£ 27.93</td>
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<tr>
<td>Reinforcement</td>
<td>£ 37.54</td>
<td>£ 4.80</td>
<td>£ 18.20</td>
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<tr>
<td>Formwork / Deck</td>
<td>£ 43.55</td>
<td>£ 25.85</td>
<td>£ 21.00</td>
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<tr>
<td>Steelwork</td>
<td>£ -</td>
<td>£ 118.37</td>
<td>£ 45.74</td>
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<tr>
<td><strong>Construction Cost Sub Total</strong></td>
<td>£ 122.67</td>
<td>£ 165.96</td>
<td>£ 112.87</td>
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<tr>
<td>Preliminaries</td>
<td>£ 30.67</td>
<td>£ 38.17</td>
<td>£ 22.57</td>
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<tr>
<td>Overheads and Profit</td>
<td>£ 15.33</td>
<td>£ 20.41</td>
<td>£ 13.54</td>
</tr>
<tr>
<td><strong>Cost per m² GIFA</strong></td>
<td>£ 168.67</td>
<td>£ 224.54</td>
<td>£ 148.99</td>
</tr>
<tr>
<td><strong>Programme</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Procurement (weeks)</td>
<td>7</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>Construction (weeks)</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>10</td>
<td>16</td>
<td>10</td>
</tr>
</tbody>
</table>

- ~12% cheaper than flat slab
- Re-use of shutters would dramatically reduce cost
- At least as quick
Bridging the gap between construction + manufacturing

Materials

Factory nodes create products

Platform nodes create sub assemblies

Assembly at point of use (site)

High performing assets, networks + systems

Initiatives to optimise functional product cost

Controlled logistics

Optimise conversion cost

Controlled logistics

Optimise conversion cost

Controlled logistics

Some materials move straight to sub-assembly workstations
The alphabet effect

First level of abstraction
Symbol represents real object

Second level of abstraction
Limited, abstract symbols can be used to represent real objects + concepts

- Reality
- Egyptian hieroglyphs 3,000 BCE ~5,000 characters
- Sinai script 1,850 BCE
- Phoenician alphabet 1,250 BCE 22 characters
- Ancient Greek alphabet 600 BCE
- Roman alphabet 100 CE
Platforms are a first order of abstraction

Manufacturing processes are a second order of abstraction
Sub Assembly Workstations (SAWs)

Analysis, integration, rationalisation, optimisation

Platform selection or creation

Sub Assembly Workstations

- Cassette to avoid working at height (e.g. residential ceiling)
- 3D manipulation to ease assembly (e.g. riser)
- Bring the worker to the assembly of large item (e.g. Superblock)
- Linear processes (e.g. welding a beam)

Components + products

Sub Assemblies

Defined connections + interfaces

Full list of SAWs would expand over time to include robots / cobots / additive manufacture

Design, Manufacture, Assembly, Operation + social outcomes
SAWs are the meeting place of:

**Labour**
- Low skilled operative
- Skilled operative
- Supervisor

**Information**
- Skills + training
- Standardised processes / APQP / standard operating procedures / guided instruction

**Materials**
- Existing products (+ those developed by manufacturers)
- Products developed specifically for departments (may be applicable to multiple building types)

**Manufacturing facilities**
- Cassettes to avoid working at height (e.g. residential ceiling)
- 3D manipulation to ease assembly (e.g. riser)
- Bring the worker to the assembly of large item (e.g. Superblock)
- Linear processes (e.g. welding a beam)

**High performing assets, networks + systems**
- Existing suppliers could already map their capability to SAWs
- SAWs become a unit of capacity + capability
Superblocks

1. Gravel board
2. Brick slips
3. Wind post oid
4. Extruded phenolic insulation
5. Mineral wool insulation
6. Stainless steel spacers
7. Perforated stainless steel band strap
8. Stainless steel band strap
Superblock manufacture
Activities by skill

Labour by activity:
- Facade installation: 21.4%
- Facade panel assembly: 4.8%
- Slip production: X%
- Block production: X%
- Transport: X%
- Low skilled operative: X%
- Skilled operative: X%
- Supervisor: X%

Labour by cost:
- Supervisor: 73.8%
Superblock SAWs
The power law distribution curve

Number of visitors / amount of investment

Number of websites / participants
Component • • • • • • Platform • • • • • • Product

Shipping container 

Global freight infrastructure

Low cost, reliable global trade + supply chains
Component • • • • • Platform • • • • • Product

Uber

• • • • •

Peer-to-peer ride sharing, food delivery and transportation network

Apple iPhone

0 1 2 3 4 5 6 7

Millions of units sold

Q3 ’07 0.27
Q4 ’07 1.12
Q1 ’08 2.32
Q2 ’08 1.7
Q3 ’08 0.72
Q4 ’08 6.89

App Store opened 10 July 2008
The designer grants the Client an irrevocable, royalty-free, worldwide and non-exclusive licence in perpetuity to use, copy and reproduce the Materials for any purpose whatsoever.
Lowering the barriers to entry

Individual inputs

Processes + operating procedures

Skills + competence training

Parametric tools + digital configurators

Components, products + interfaces

SAWs to include advanced manufacturing

Digital ecosystem / marketplace - construction ‘App Store’
Factory + workforce sharing

Requirements for single programme - often currently served by one factory

Aggregating the requirements for multiple programmes (through the use of shared components) starts to create a consistent pipeline

Eventually a level workload is created, which can be split across multiple facilities working at a known and predefined level of output
CONSTRUCTING
THE TEAM
BY SIR MICHAEL LAUDAM

Implementation begins with clients - Clients, and especially Government, continue to have a role in promoting excellence in design;

- Government should commit itself to being a best practice client;

- A productivity target of 30% real cost reduction by the year 2000 should be launched;

- There is scope for improvements through greater standardisation of components and design details and more off-site prefabrication. This will require effective teamwork by designers, contractors, subcontractors and manufacturers;

- Private clients have a leading role and should come together in a Construction Clients’ Forum;

- Tenders should be evaluated by clients on quality as well as price.
Things that happened in 1998...

04 September 1998

01 November 1998
Thank you.

@Jaimie_BW
@BrydenWood
BrydenWood
brydenwood.co.uk